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A JOURNAL OF COLD BLOODED VERTEBRATES

Established in 1913

PUBLISHED BY
THE AMERICAN SOCIETY OF ICHTHYOLOGISTS
AND HERPETOLOGISTS

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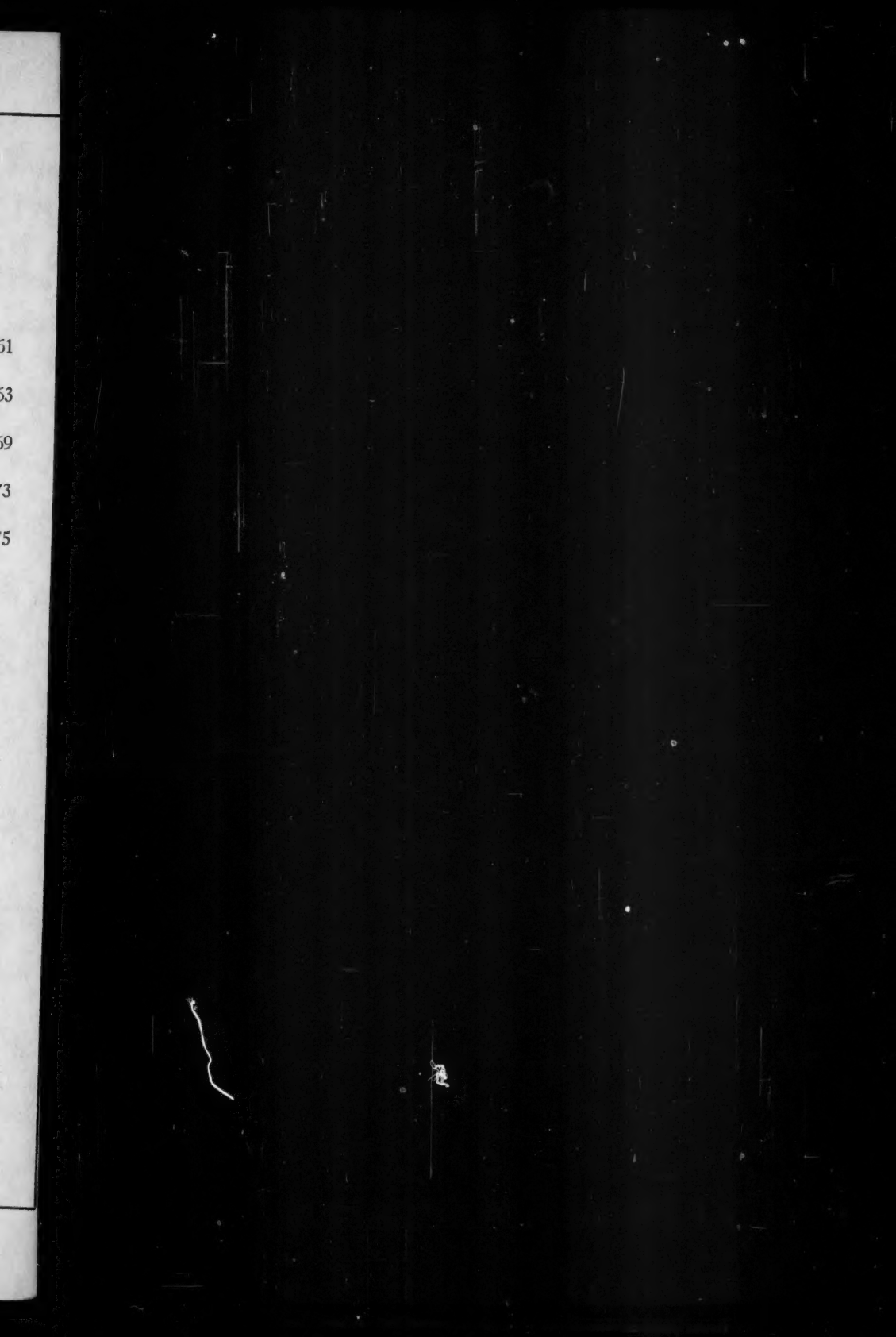

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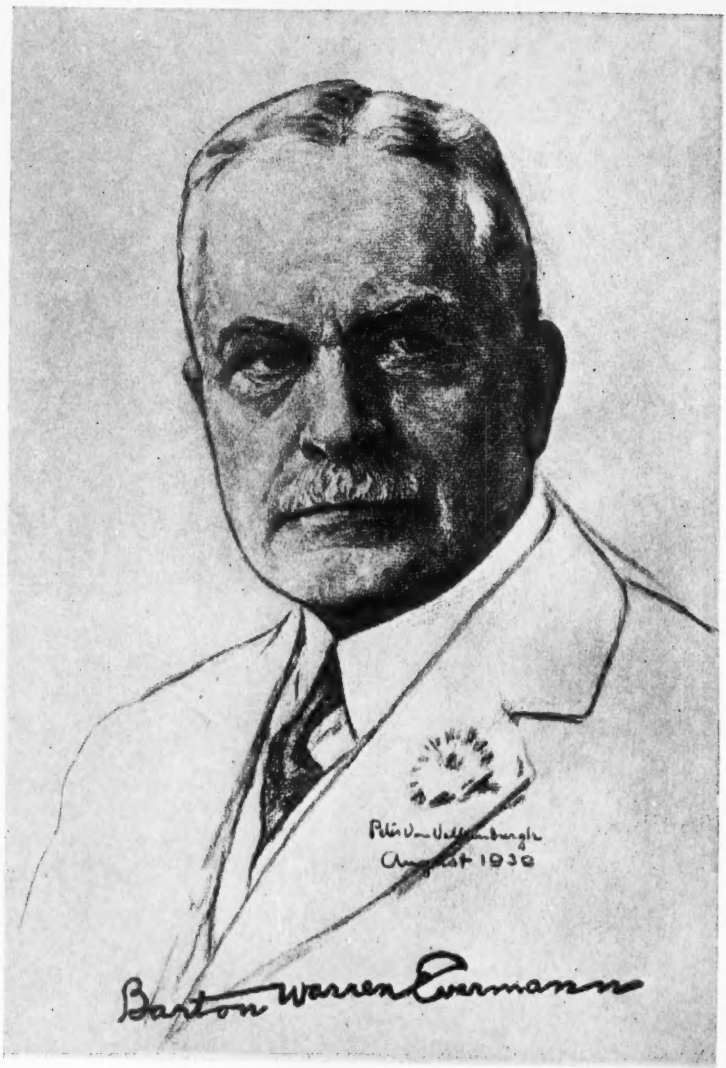

Barton Warren Evermann

Barton Warren Evermann, 1853-1932

IN the death of Dr. Evermann biological science lost one of its most enthusiastic supporters, and American ichthyology was an especially heavy loser. Within a comparatively few years there have passed David Starr Jordan, Charles H. Gilbert, Carl H. Eigenmann and Barton Warren Evermann, four zoologists who dominated the study of fishes in this country for half a century and to such an extent that their combined efforts may come to be known as a "school" or a "regime." They approached many of their subjects in a similar manner, that is from the side of taxonomy. One of the characteristics of the "school" was the frequency with which their papers appeared under joint authorship.

It seemed to those of us who were closely associated with Dr. Evermann that he began to decline in 1923 when, on a trip to the lower Colorado River, he contracted a severe bronchial disturbance which never thereafter completely vanished. With each succeeding attack he was not able to completely regain the loss. Nevertheless, an indomitable will to keep doing things, and a physique which was normally very robust, kept him at active duty until June 21, 1932. He then went to Stanford Hospital for a brief rest. One complication followed another and he finally succumbed to pneumonia on September 27, 1932.

Dr. Evermann was born in Iowa on October 24, 1853, and was educated in Indiana, the state he always considered home. The friendship which began in his college days with Dr. Jordan, then president of Indiana University, was very intimate and lasting. It resulted in a long list of papers and books on fishes under joint authorship. This mutual willingness to help each other was not confined to joint works but extended to real assistance in the preparation of their own papers. They seemed to take it as a matter of course that they should read and correct each other's proof sheets and supply illustrations and references.

Dr. Evermann left a card index of titles to his publications, the last number being 387. His bibliography was published in 1905 (Indiana University Bulletin, vol. 2, no. 6, March 1905, pp. 84-90), and it is hoped that the remaining titles can be brought up to date. All of the latter ones (1920-1930) may be found in the various annual reports of the Director of the California Academy of Sciences. The last publication prior to his death was a review of W. S. Blatchley's book "My Nature Nook" (Science, vol. 76, no. 1959, July 15, 1932, pp. 57-58). He left finished and ready for the press a paper on the fishes of

the Revillagigedo Islands Expedition of 1925 (joint authorship with H. W. Clark) and his annual report as Director of the Academy for 1931. Plans had been drawn for several other publications but so far as known he had not begun the actual preparation of any of them. It is seldom that so little unfinished work is left behind.

The fame of the man rests largely on his studies of fishes but an analysis of his card index shows that he published widely on other branches. There are, as a very general classification, 196 papers on fishes; 59 on birds; 30 on mammals; and the remainder on various subjects. Many of his undertakings were of monographic nature, and involved an enormous amount of routine and detail. Most of his work was done at the same time the duties of a strenuous administrative position were being fulfilled. He attended to a voluminous correspondence, largely by rapid fire dictation, but his manuscripts were laboriously and studiously written in long hand.

Dr. Evermann taught in the public schools of Indiana and California for 10 years after leaving college and this experience left a lasting impression upon him; at heart he was a teacher. He held various positions with the U. S. Bureau of Fisheries from 1886 to 1914, his most prolific period as a writer. He went to the California Academy of Sciences in 1914 as Director, a position which he held until his death. During his regime many advances were made by the Academy, the most important perhaps being the establishment of the Steinhart Aquarium and the acquisition of the great collection of fishes formerly belonging to Indiana University. More than 20 volumes of scientific reports were published under his direction and expeditions were dispatched far and wide.

Many species of animals and plants and five genera of fishes have been named for him. The genera are: *Evermannia* Jordan, 1895; *Evermanella* Fowler, 1901; *Evermanella* Eigenmann, 1903 (changed to *Evermanolus* by Eigenmann in 1907); and *Evermannichthys* Metzelaar, 1919. The name Mt. Evermann for the highest peak of Socorro Island has been accepted by the Mexican Government and by the U. S. Geographic Board.

On October 24, 1875, Dr. Evermann married Meade Hawkins at Burlington, Indiana; she died at Berkeley, California, on February 9, 1929. A son and a daughter survive: Toxaway Bronte and Mrs. Edith Humphrey, both of Washington, D.C. In addition to these, a sister, Miss Dora Evermann was with him when he died. His body was cremated and the ashes were buried in Burlington Cemetery at Burlington, Indiana, on October 22, 1932.

G. D. HANNA

California Academy of Sciences,
San Francisco, California.

Report on Two Collections of Lower California Marine Fishes

By Joseph H. Wales

SIXTY of the sixty-nine species here reported were collected by the writer while he was a member of the California Division of Fish and Game Lower California Expedition of 1931. This boat trip was made to La Paz in the Gulf of California and back between March 31 and April 17.

Map of Lower California, locating points mentioned in text.

The fish were collected by seining, by hook and line, by dip-netting under a drop-light at night, and in tide pools. All of the methods were fairly successful.

Ten species were collected by Ira L. Wiggins while botanizing in Lower California during April and May, 1931, and through his courtesy are included in this report.

The collections are in the Natural History Museum, Stanford University.

None of the species here included are new but the ranges of at least sixteen have been extended.

The writer wishes to thank the California Division of Fish and Game for permitting him to accompany the expedition. H. R. Hill of the Los Angeles Museum, kindly assisted in the identification of *Mycteroperca* and *Lutianus*.

Galeidae—Requiem Sharks

1. *Triakis semifasciata* Girard.—Ensenada Bay, April 1, one specimen three feet long, seined. Turtle Bay, April 4, many seined.

Rhinobatidae—Guitar Fishes

2. *Rhinobatos productus* Ayres.—Turtle Bay, April 4, many seined. Magdalena Bay, April 7, four seined.

Dasyatidae—Sting Rays

3. *Dasyatis dipterura* Jordan and Gilbert.—La Paz, April 10, one seined, 375 mm broad.

Myliobatidae—Eagle Rays

4. *Myliobatis californicus* Gill.—Turtle Bay, April 4, five seined.

Myridae—Worm Eels

5. *Myrophis vafer* Jordan and Gilbert.—Magdalena Bay, April 7, two specimens, 170 mm and 130 mm long. La Paz, April 9, three specimens, 260 mm, 280 mm and 300 mm. All five specimens were taken by drop light. All had insertion of dorsal fin slightly closer gill slit than anus. The Magdalena specimens seem to constitute a northern record for the west side of the peninsula.

Muraenidae—Morays

6. *Gymnothorax dovii* (Günther).—La Paz, April 10, one specimen 480 mm long, from tide pool. Head 2.5 in trunk.

Albulidae—Bone Fishes

7. *Albula vulpes* (Linnaeus).—Turtle Bay, April 4, fourteen specimens, 35-70 mm, seined.

Dussumieriidae—Round Herrings

8. *Etrumeus micropus* Temminck and Schlegel.—Turtle Bay, April 4, one seined.

Clupeidae—Herrings

9. *Sardinops caerulea* (Girard).—Turtle Bay, April 4, many seined. Magdalena Bay, April 7, many seined. La Paz, April 9, one specimen 42 mm long, by drop-light.

Engraulididae—Anchovies

10. *Cetengraulis mysticetus* (Günther).—Magdalena Bay, April 6, six specimens about 135 mm. long, seined by tuna boat the previous night in the bay. Apparently the first record for the west side of the peninsula.

11. *Engraulis mordax mordax* Girard.—Turtle Bay, April 4, one specimen 70 mm, seined. La Paz, April 9, one taken by drop-light. Apparently the first record for the Gulf.

Synodontidae—Lizard Fishes

12. *Synodus,* sp. Mainland opposite Ceralbo Island, April 11, one post-larval specimen 60 mm long, by drop-light. Transparent with nine patches of melanophores on dorsal surface from head to tail; ten round black spots situated internally along the median ventral axis of the body, the first two pairs separate, the rest connected; base of caudal black.

Belonidae—Needle Fishes

13. *Strongylura exilis* (Girard).—Turtle Bay, April 4, five specimens, 500-650 mm, seined.

Hemirhamphidae—Half Beaks

14. *Hyporhamphus roberti* (Cuvier and Valenciennes).—Turtle Bay, April 4, six specimens, 110-135 mm, seined. La Paz, April 10, three specimens about 270 mm, by seine and drop-light.

Exocoetidae—Flying Fishes

15. *Fodiator acutus* (Cuvier and Valenciennes).—La Paz, April 9, four specimens, 165-185 mm, by drop-light.

Atherinidae—Silversides

16. *Atherinopsis sonorae* Osburn and Nichols.—Turtle Bay, April 4, hook and line.

17. *Atherinops affinis magdalenae* Fowler.—Magdalena Bay, April 7, many seined.

Mugilidae—Mullets

18. *Mugil curema* Cuvier and Valenciennes.—Turtle Bay, April 4, many seined. Magdalena Bay, April 7, many seined. La Paz, April 9, many seined.

19.—*Mugil cephalus* Linnaeus.—Valencia Beach, April 2, one specimen collected by Ira L. Wiggins. San Jose del Cabo, May 9 and May 14, five and six young specimens respectively, collected by Ira L. Wiggins.

20. *Chaenomugil proboscideus* (Günther).—Near east side of peninsula opposite Ceralbo I., April 11, one specimen by drop-light.

Sphyraenidae—Barracudas

21. *Sphyraena argentea* Girard.—Magdalena Bay, April 8, two specimens about 370 mm, hook and line.

Scombridae—Mackerels

22. *Scomberomorus sierra* Jordan and Starks.—La Paz, mouth of south channel, April 9, one 750 mm specimen, hook and line.

23. *Pneumatophorus diego* (Ayres).—Magdalena Bay, April 7, many seined. Apparently the first Lower California record.

24. *Sarda chilensis* Cuvier and Valenciennes.—Turtle Bay, April 4, many seined.

25. *Katsuwonus pelamis* (Linnaeus).—Fifty miles south of Santa Margarita Island, April 8, three specimens, hook and line.

26. *Katsuwonus lineatus* Kishinouye.—Off Santa Margarita Island, April 8, two specimens about 580 mm long. These two apparently constitute the third record of the species. The second record was by G. C. Thomas, Jr., and G. C. Thomas, III (Game Fish of the Pacific, Southern Californian and Mexican, 1930, pl. opposite p. 28).

27. *Neothunnus macropterus* (Schlegel).—La Paz, south channel, April 9, one specimen, 600 mm long. Head 3 in body, eye 5.5 in head, maxillary reaching pupil, pectoral 7/8 head, ventrals 2.8 head, anal lobe length of ventrals, lobe of soft dorsal slightly longer, longest dorsal spine 2.5 in head, caudal lobes 1.4 head. Dorsal XIII, 13, 9 finlets. A. 11, 8 finlets.

Carangidae—Pampanos

28. *Oligoplites mundus* Jordan and Starks.—La Paz, April 10, one specimen seined.

29. *Trachurops crumenophthalmus* (Bloch).—La Paz, April 10, one specimen seined.

Serranidae—Sea Basses

30. *Mycteroperca xenarcha* Jordan.—Between Seal Rock and Ceralbo Island, April 11, one specimen, 775 mm long. Anal III, 12; 4th anal ray 2 in head; 10th dorsal ray 3.67 in head; 3rd dorsal spine longest, 4 in head;

interorbital width 4.5 in head; 2 canines on each side of upper jaw; 1 on each side of lower jaw; maxillary 2.2 in head. Color dark brown, heavily speckled on head, body, and fins with darker spots smaller than pupil; spots showing up on lighter areas such as ventral part of body and opercles; fins all dark brown with spots. This specimen has been compared with one of *xenarcha* in the Stanford collection, and found to agree reasonably well except that the Stanford specimen does not show the black spots.

31. *Paralabrax nebulifer* (Girard).—Turtle Bay, April 4, two specimens about 100 mm long, seined. Off Abreojos Point, 17 to 20 fathoms, April 5, many caught on hook and line. Twenty-four specimens examined have 24 vertebrae each.

32. *Paralabrax clathratus* (Girard).—San Martin Island, April 1, 10 fathoms, one specimen on hook and line.

Xenichthyidae—Xenichthyid Fishes

33. *Xenistius californiensis* (Steindachner).—Magdalena Bay, April 7, two specimens 80 and 90 mm, seined.

Lutianidae—Snappers

34. *Lutianus guttatus* (Steindachner).—Between Seal Rock and Ceralbo Island, April 11, one specimen 625 mm long, hook and line. This example differs from descriptions in Meek and Hildebrand's *The Marine Fishes of Panama* in the smaller eye (5.75 in head); in the angulated anal fin (4th ray longest); and in the color, which in life was scarlet, slightly darker above axis; lower sides of head and body scarlet, with a silvery cast; a few light green spots anteriorly along axis of body below lateral line; belly and breast mostly white; fins plain scarlet; preopercle with violet cast; no large dark spot on back.

Haemulidae—Grunts

35. *Anisotremus interruptus* (Gill).—Turtle Bay, April 4, one specimen, 650 mm, seined.

Gerridae—Mojarras

36. *Eucinostomus californiensis* (Gill).—Turtle Bay, April 4, many seined. Magdalena Bay, April 7, many seined.

37. *Xystaema cinereum* (Walbaum).—La Paz, April 10, one specimen 330 mm, seined.

38. *Gerres lineatus* (Humboldt).—La Paz, April 10, one 220 mm, seined.

Kyphosidae—Rudder Fishes

39. *Girella nigricans* (Ayres).—Turtle Bay, April 4, four specimens seined, and many taken in tide pools. Socorro, April 9, twelve specimens from tide pools collected by Ira L. Wiggins. Halfway House, April 2, one specimen from tide pool, collected by Ira L. Wiggins.

Sciaenidae—Croakers

40. *Seriphus politus* (Ayres).—Turtle Bay, April 4, one specimen 145 mm, seined.

41. *Menticirrhus undulatus* (Girard).—Turtle Bay, April 4, two specimens 440 and 520 mm, seined.

42. *Cynoscion parvipinnis* Ayres.—La Paz, April 10, one specimen 520 mm long, seined. Two canines; eye 6.75 in head; pectoral 2 in head; dorsal X, I, 20. Seined. Apparently a new record for the Gulf.

43. *Genyonemus lineatus* (Ayres).—San Carlos Bay, April 2, twenty specimens, 200-300 mm, hook and line.

Embiotocidae—Surf Perches

44. *Hyperprosopon argenteum* Gibbons.—San Martin Island, April 1, one specimen 210 mm long, 10 fathoms, hook and line. San Carlos Bay, April 2, one specimen 170 mm, hook and line. A southern record.

Pomacentridae—Demoiselles

45. *Abudefduf marginatus* (Bloch).—La Ballena, April 30, three specimens from tide pools, collected by Ira L. Wiggins.

46. *Abudefduf declivifrons* (Gill).—La Ballena, April 30, one specimen from tide pool. Collected by Ira L. Wiggins.

Labridae—Wrasses

47. *Pimelometopon pulcher* (Ayres).—Off Abreojos Point, 17 to 20 fathoms, April 5, one specimen 400 mm long, hook and line.

Tetraodontidae—Swell Fishes

48. *Spheroides annulatus* (Jenyns).—Turtle Bay, April 4, one specimen 300 mm, seined. La Paz, April 10, twenty specimens about 80 mm in length, seined.

49. *Spheroides politus* (Girard).—La Paz, April 9, two specimens, 330 mm and 340 mm long, seined. These differ from specimens of *S. annulatus* in the much broader and flatter interorbital space (2.5 to 2.75 in head in *S. politus*, and 3.5 in *S. annulatus*) and in the coloration, *politus* having the black spots much more numerous and distinct.

Scorpaenidae—Scorpion Fishes

50. *Scorpaena guttata* Girard.—San Martin Island, April 1, two specimens, 210 mm and 290 mm long, hook and line.

51. *Sebastodes serranoides* Eigenmann and Eigenmann.—Off Cape Colnett, 43 fathoms, April 1, four specimens, hook and line. Apparently a southern record.

52. *Sebastodes goodei* Eigenmann and Eigenmann.—Ranger Bank, 70 to 90 fathoms, April 3, four specimens, hook and line. Thetis Bank, 60 to 70 fathoms, April 6, one specimen, hook and line. A southern record.

53. *Sebastodes pinniger* (Gill).—Off Cape Colnett, 43 fathoms, April 1, two specimens, hook and line. Apparently a southern record.

54. *Sebastodes elongatus* (Ayres).—Ranger Bank, 70-90 fathoms, April 3 and April 15, two and one specimens respectively, hook and line. Apparently a southern record.

55. *Sebastodes atrovirens* (Jordan and Gilbert).—San Martin Island, 10 fathoms, April 1, one specimen, hook and line. Apparently a southern record.

56. *Sebastodes vexillaris* (Jordan and Gilbert).—Off Cape Colnett, 43 fathoms, April 1, one specimen, hook and line. Apparently a southern record.

57. *Sebastodes chlorostictus* (Jordan and Gilbert).—Ranger Bank, 70 to 90 fathoms, April 3 and April 15, four and eight specimens respectively. Apparently a southern record.

58. *Sebastodes constellatus* (Jordan and Gilbert).—Ranger Bank, 70 to 90 fathoms, April 3, three specimens, hook and line. Apparently a southern record.

Cottidae—Sculpins

59. *Clinocottus analis australis* Hubbs.—Turtle Bay, April 4, four specimens, tide pools.

Eleotridae—Sleepers

60. *Dormitator maculatus* (Bloch).—San Jose del Cabo, May 14, four specimens, collected by Ira L. Wiggins.

Gobiidae—Gobies

61. *Bathygobius soporator* Cuvier and Valenciennes.—La Paz, April 9, four specimens, 25-65 mm, tide pools.

62. *Gobiosoma histrio* Jordan.—Bahia de Concepcion, April 22, two specimens, collected by Ira L. Wiggins.

63. *Aboma chiquita* (Jordan and Evermann).—Bahia de Concepcion, April 22, nine specimens. Eight miles north of Santa Rosalia, April 21, three specimens.

Malacanthidae—Blanquillos

64. *Caulolatilus princeps* (Jenyns).—Off Cape Colnett, San Geronimo Island, Ranger Bank, Cerros Island, Abreojos Point, and Thetis Bank. April 2 to April 14. Abundant, hook and line.

Blenniidae—Blennies

65. *Labrisomus xanti* Gill.—La Ballena, April 30, one specimen, tide pool.

66. *Hypsoblennius gilberti* (Jordan).—Socorro, April 9, one specimen, tide pool.

67. *Runula azalea* Jordan and Bollman.—Magdalena Bay, April 6, one specimen, by drop-light. Mainland, opposite Ceralbo Island, April 11, three specimens, by drop-light, all about 35 mm long. Apparently the first record north of Cape San Lucas.

Ophidiidae—Cusk Eels

68. *Otophidium galeoides* (Gilbert).—La Paz, April 10, one specimen 75 mm long, on beach.

Pleuronectidae—Flounders

69. *Citharichthys fragilis* Gilbert.—Thetis Bank, 60 to 70 fathoms, April 6, one specimen 220 mm long, hook and line. Apparently the first record from the west side of the peninsula.

Natural History Museum, Stanford University, California.

Feeding Habits and Molt of *Crotalus confluentus oreganus* in Captivity

By Tracy I. Storer and Beryl M. Wilson[1]

THERE is a notable dearth of exact information concerning the food habits of serpents. Data on these reptiles in the wild consist chiefly of isolated observations on prey actually observed in process of being captured or eaten, or of the food found in the stomachs of specimens which have been killed. The slight chance for observations of the first sort and the large number of specimens examined in which the digestive tract is empty have further limited the number of useful records. The chance receipt of three living specimens of the Pacific rattlesnake (*Crotalus confluentus oreganus* Holbrook) in a laboratory where a colony of domestic Norway rats is maintained for nutritional studies has afforded opportunity to study the food habits of this species.

Our first specimen (No. 1) was captured at Bluff Lake, 7,500 feet altitude, San Bernardino Mountains, California, on June 26, 1928. This animal was in the "black phase" of coloration. The other two were received May 6 (No. 2) and in June (No. 3) respectively, of 1930; one of these (No. 2) was obtained somewhere in the San Joaquin Valley; the other presumably somewhere to the north and west of Davis: it was impossible to learn the exact localities of capture. However, all are undoubtedly of the sub-species indicated above.

No. 1 weighed 452 grams on August 25, 1928. No measurements have been taken, and, unfortunately, exact record of the rattles has not been kept. No. 1 had either 6 or 7 rattles when received; it has lost some, at the tip, and now has 10 rattles. It has molted twice each year or 7 times in 3½ years and so should have either 13 or 14 rattles if one is acquired at each molt.

However, close inspection of the snakes after certain molts has raised a suspicion in our minds that they did not always acquire a rattle with each molt; this needs confirmation. Snake No. 2 molted twice in 1930 and once in 1931, while No. 3 molted once in 1930 and twice in 1931. All of the snakes have lost terminal rattles, but in the absence of distinguishing marks on the individual rattles the number so lost is uncertain.

The eyes of snake No. 1 appeared "milky" or "clouded" on August 3. 1931; this condition had cleared up by August 6 and the snake molted on August 12. With No. 2 the eyes appeared clouded on June 13, 1931, and the snake molted on June 23. In three years the first molt of the year of snake No. 1 has occurred from May 27 to June 8, and the second molt (in 4 years) from July 27 to August 20. Here then is a suggestion as to the basis for the popular belief that "rattlesnakes are blind in August," that is, preparing to molt. The molts of the other two snakes have been somewhat more irregularly spaced.

[1] Contribution from the Division of Zoology, College of Agriculture, University of California.

There has always been a decided difference in the temperament of these three snakes. No. 1 has from the beginning of its period of captivity been "sullen" and has rattled on the least provocation. When first in the laboratory it rattled almost continuously. At that time the snake was caged in a room where the step of a person vibrated the floor and the snake responded by rattling at any approach. Then, also, a low vocal note from a person would stimulate it to rattle. Now, in a more quiet and substantial location, and after more than 3½ years in captivity, it still responds to a slight disturbance by rattling. This snake spends much of its time in the coiled position, and if, when approached, it happens to be outstretched, it immediately assumes the coiled position and commences to rattle. The other two, paler, brown and yellow colored, snakes have reacted differently. They seem to require much more stimulus before beginning to rattle. No. 2 (the larger) spends much of its time extended and seems to exhibit curiosity when approached, coming up to the glass front of the cage when an observer places a hand on the outside of the glass; this snake always follows any cleaning implement introduced into the cage. When moving about in its cage (11″ high by 24″x36″ floor), it often travels with its head close to the top of the enclosure, whereas the other two, when moving, keep their heads and bodies close to the shavings on the floor of their respective cages.

Our observations on the difference in reaction of the blackish snake (No. 1) are paralleled by the experience of a highway-construction foreman on the Big Trees road east of Dorrington, Calaveras County, California, who stated that in the summer of 1930 his crew had killed between 25 and 30 rattlesnakes (all *oreganus*) in that region; all were relatively docile except one which he characterized as a "black diamond rattler" and that individual showed much fight before being dispatched.

Our No. 1 snake when first captured was almost black. The dorsal pattern was relatively inconspicuous. Prior to its earlier molts it assumed a slightly more grayish appearance, but when fresh molted was almost velvety black again. Now, within the past year, it has become much grayer and has maintained this tone of coloration for a long period of time.

Since their respective arrival in the laboratory all of these rattlesnakes have been offered food in the form of live rats at frequent intervals. We found by experience that if offered food while an observer was present the snake would usually kill the rat but would not eat it. In consequence it has been our practice to place rats in the cages at the end of the day, so that the snakes would be undisturbed when ready to feed. Water was offered snake No. 1 in 1928, but there was no evidence that any was taken so none has been provided for any of the snakes subsequently. Other reptiles in captivity are known to require drinking water. The water necessary for these rattlesnakes has, therefore, been obtained entirely from the fluids in the bodies of the rats consumed. The dry substance in the body of the captive Norway rat averages around 32 per cent, hence the fluid (water) is about 68 per cent (Donaldson, H. H., *The Rat,* revised ed., 1924: 300). The total available fluid intake for snake No. 1 has, there-

fore, been 705, 983 and 980 grams, in 1929, 1930, and 1931 respectively, or a total fluid intake per year but slightly in excess of the body weight of the animal itself. A human being if restricted to the same proportion of fluid intake would receive about twenty gallons annually! Fluids are lost from the body of a reptile in small amounts in the feces, in the secretions involved in sloughing of the skin, and in the respiratory process. Presumably there is no water loss through the skin. The body temperature of a reptile is unregulated; it is in most instances practically that of the environment. Lacking a regulated body temperature there is a lessened need for moisture, which, in birds and mammals, is used to a considerable extent in the regulation of body temperature. The success of this degree of conservatism in water maintenance of the rattlesnake is further indicated in an instance reported by Duméril and quoted by Flower (*Proc. Zool. Soc. London,* 1925: 977), of a specimen in the Jardin des Plantes in Paris that went 22 months without eating and then fed and continued to live for 10 years. The water relations of our snakes at Davis are all the more remarkable since these snakes have been kept in a room moderately heated in winter and exposed to the heat of mid-summer in the Sacramento Valley, tempered only by windows and the walls of a reinforced concrete building. It should be noted that Mitchell (*Researches upon the Venom of the Rattlesnake,* Smiths. Contr. to Knowledge, 1861: 4) reported the necessity of a water supply for his snakes, especially in respect to molt. We have not had this experience. Our snakes, with the possible exception of one instance with No. 1, have molted their skins entire. Mitchell was using *Crotalus durissus* [=*horridus*], an inhabitant of the eastern humid region, while we have used *oreganus,* an inhabitant of the semi-arid region of California.

Of rats offered and not killed by the snakes, several have subsequently been killed by us, but we have found no evidence that they had been struck save in one instance. One rat offered April 19, 1929, to snake No. 1, was struck in the middle of the back. This rat was still alive on the following day and when killed by us and examined showed only two fang punctures in the skin, surrounded by darkened areas; the muscles adjacent and the viscera appeared normal. The snake had killed a 91 gram rat at 5 P.M. on April 11, which was eaten after 12 M. on April 12.

These snakes are all kept in solid wooden cages, the floors of which are covered with wood shavings, changed at long intervals. Record has been kept of every fecal mass, as noted in the chart. It is evident that feces are not passed after each feeding, but only at long and irregular intervals.

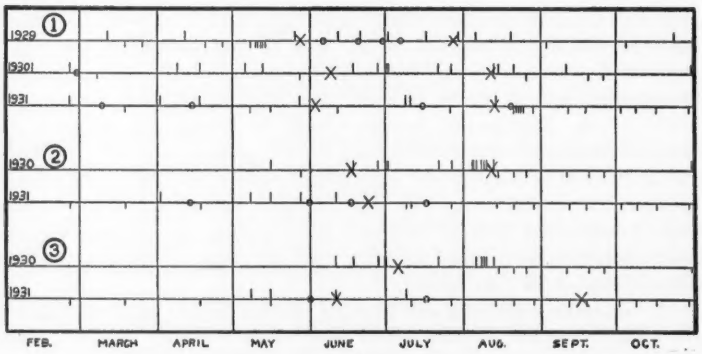
Detailed record of the food, feces and molt has been kept since these snakes arrived in the laboratory. In summary, snake No. 1 in 1928 ate, between July 20 and October 3, four rats and two house mice, totalling probably 400 grams (records not complete in 1928), voided feces twice and molted once; in 1929 it consumed 11 rats, totalling 1,037 grams in weight during 266 days, voided feces four times and molted twice; in 1930 it ate 17 rats totalling 1,446 grams, in 264 days, voided feces once and molted

twice; and in 1931 consumed 7 rats grossing 1,442 grams, in 170 days, voided feces 4 times and molted twice.

Snake No. 2 in 1930 ate 15 rats (all under 100 grams in weight) totalling not over 952 grams, between May 15 and August 12 (89 days), and shed twice; in 1931 it ate 5 rats, weighing 861 grams, in 71 days, voided feces 4 times and molted once.

Snake No. 3 in 1930 ate 9 or 10 rats, grossing between about 550 and 600 grams, in 66 days and molted once; in 1931 it ate 5 rats totalling 768 grams, in 99 days, voided feces twice and molted twice.

The exact amounts taken by snakes Nos. 2 and 3 in 1930 are slightly in doubt as these two snakes are housed in one cage and it was not possible in some instances to tell which of certain small rats put in the cages were eaten by each of the snakes. In our notes there is no record of feces passed in 1930 by snakes Nos. 2 and 3, but there is at least a possibility that these were not recorded by the attendant.



Record of food taken (⊥), or rejected (T), feces passed (O) and molt (X) of three captive specimens of *Crotalus confluentus oreganus* Holbrook

The size of rats offered for feeding has varied. In 1929 No. 1 ate rats of from 67 to 128 grams weight; a few of larger weight were not eaten but this may not have been due to size so much as satiety. In 1930 the weight of rats fed varied from 52 to 155 grams, while in 1931 distinctly heavier rats were taken, of 104 to 326 grams; others refused in this year were within these limits. The other two snakes have eaten smaller rats, below 100 grams in 1930 and from 96 to 204 grams in 1931. It is not yet evident whether some of the larger rats offered these two snakes in 1931 were refused because of larger size or because the snakes had ceased to feed for the season, although we are inclined to the latter explanation since many of those offered but not eaten were well within the weight range of those taken earlier in the year.

These data on the Pacific rattlesnake in captivity obviously do not give an accurate idea of the amount of food required by the species in the wild; yet they do indicate that relatively small amounts of food with fluid

content as calculated, are adequate not only for maintenance, but provide for growth and molt. Even if doubled or trebled under natural conditions the totals would be very modest in relation to the necessary food intake of homiothermous birds and mammals, and would explain why so many of the snakes collected in natural surroundings have no recognizable food materials in the digestive tract, and likewise the apparent scarcity of serpents in many places. Taking food in relatively large units only at considerable intervals they may remain in retirement and inactivity much of the time, a condition decidedly in contrast to that of birds and mammals much of whose time must of necessity be spent in procuring food.

The accompanying chart gives a graphic record of activities of these snakes in captivity.

UNIVERSITY OF CALIFORNIA, DAVIS, CALIFORNIA.

Blanding's Turtle, *Emys blandingii* (Holbrook), in Pennsylvania

By M. GRAHAM NETTING

WHEN as well-informed a worker as De Sola[1] omits Blanding's turtle from consideration in a list of the turtles of the northeastern states, as noted by Babcock,[2] it seems worthwhile to call attention to the occurrence of this species in Pennsylvania. The first record of *Emys blandingii* in this state, based on specimens in hand, was published by Stewart.[3] His record was based upon two specimens which were collected near Lewisburg. In correspondence, Dr. Stewart informed me that one of these specimens was brought to him in April or March of 1927 from Kincade Swamp, which lies in Northumberland County although only one mile east of Lewisburg. The second specimen consisted of a carapace only which Dr. Stewart found in the collection of the Bucknell University Museum, and which one of his associates recalled as having been taken about 1905 in a small pond one mile south of Winfield in Union County. The distance between these localities is approximately five miles. In addition to the above-mentioned specimens known from Pennsylvania, the Carnegie Museum has two others; No. 3188 was collected at Conneaut Lake in Crawford Co., on August 20, 1904, by Dr. D. A. Atkinson, and No. 3189 was collected at Linesville, in the same county, on June 9, 1906, also by Dr. Atkinson. These localities are approximately six miles apart.

Numerous hypotheses, none of which can be accepted as final, may be offered in explanation of this discontinuous distribution.

1. Blanding's turtle may be found elsewhere in the northern part of the state if systematically hunted over a period of years.

[1] De Sola, C. Ralph; Bull. N. Y. Zool. Soc., 34, (5), 1931: 131-159.
[2] Babcock, Harold L.; Copeia, (1), 1932: 43.
[3] Stewart, N. H.; Proc. Penna. Acad. Sci., II, 1928: 24.

2. The records for the Lewisburg area may indicate that stream capture at the western headwaters of the Susquehanna permitted this turtle to cross from the Allegheny system together with *Cryptobranchus alleganiensis* and *Graptemys geographica.*

3. The Lewisburg specimens may be the result of human introduction. In a letter to me Dr. Stewart writes, "It is possible that in some years past teachers of zoology here may have liberated some imported material. I can realize that that might have happened in the case of the one from Kincade Swamp, though I have not released any in twenty years. I doubt very much if the Union County specimen had ever been in captivity. I hope to find some in places that would not admit of any possibility of importation." The fact that Blanding's turtle was used widely in the past in comparative anatomy classes lends credence to this view. Since both of the records are from points close to the Susquehanna River, marshy spots that probably were at one time lagoons of this river, it is quite possible that a few escapes established themselves in this region and spread along the river to suitable localities.

4. The Carnegie Museum specimens from the Pymatuning region may indicate that the species is a relict form which persists in this boreal refuge. Many species of plants and animals, of which *Clemmys muhlenbergii* is one, exist as relicts in the Pymatuning area although rare, absent, or spottily-distributed elsewhere in the state. Most herpetologists may be expected to favor this explanation.

5. I must confess, however, that I find myself intrigued by my final hypothesis; namely, that Blanding's turtle may have reached Crawford County by way of the Beaver and Lake Erie Canal. This canal was completed in 1844 and closed in 1871, with an aftermath of rigorous destruction, so that its life as a continuous water-course can scarcely have exceeded thirty years. Yet in this short period *Emys blandingii* may have traversed the forty-five miles of water from the shore of Lake Erie, where it still occurs, to Conneaut Lake, which was directly connected with the canal. The Linesville specimen was taken at a locality about four miles west of the old canal bed.

I offer this suggestion that a canal may have influenced the local distribution of a turtle, not because it can be proved at the present time, but because it may stimulate zoögeographers in contiguous states to examine their maps in the light of the possible effect, on semi-aquatic or aquatic biota, of the network of canals which existed during the middle nineteenth century. In those days of canalization four major water-ways had outlets on Lake Erie: one extended southward from Toledo; another extended southward from Cleveland; the third connected Erie and Beaver; and the fourth, and most famed, extended from Buffalo eastwards. Certain of the canals were joined by short "feeders" or "crosscut" canals. Most of them were in existence for extremely few decades, yet we know that the Panama Canal during its short period of existence has begun to act as a pathway for the migration of certain fish.

CARNEGIE MUSEUM, PITTSBURGH, PENNSYLVANIA.

Herpetological Records and Notes from the Vicinity of Tucson, Arizona, July and August, 1930

By F. Willis King

Amphibians

1. *Scaphiopus couchii* Baird

This spadefoot was found in greatest numbers after heavy rains in puddles and backwater along the Rillito River near University Farm. The height of their breeding season was between July 11 and 15. Their call, which resembled most a plaintive bellow, began shortly after dark and continued until just before dawn. They call both from the edge of the muddy water and while swimming, the latter call being muffled: the male exerts his whole body in producing his call, drawing in his hind legs as the vocal pouch is protruded. The eggs varied from six to twenty-four in a clump, and are fastened in irregular masses to any solid body in the water, just below the surface, hatching in one or two days. The little tadpoles grow rapidly and are sufficiently developed in a week to make their way into the mud at the bottom of the puddle and all have vanished by two weeks.

The mucous from the spadefoot is irritating to any break in the human skin, and has a pungent odor. The males out-number the females four to one, are more active, and are often found quite a distance from water. By August 15 the species had disappeared.

2. *Scaphiopus hammondi* Baird

This species was almost always found in association with the preceeding one, but in fewer numbers. The breeding season was closely correlated with that of *S. couchii*. While the adults range from 50 to 60 mm. in body length, one young female measuring only 33 mm. was taken which showed well developed eggs. The call is more vibrant than that of *S. couchii*. This spadefoot is an active, trim, creature.

3. *Bufo alvarius* Girard

This large toad was common around the barns and gardens at the University Farm. No call was heard or breeding activities observed during July and August. The species is of considerable economic importance because of the great quantity of June and fruit beetles it catches, as well as spiders and grasshoppers. It also feeds on small lizards. I have handled numbers of them, and have seen others do likewise with no ill effects. The body color varies from a bluish gray to green or brown. The smaller warts of the back are often of a rusty color, as are the tips of the digits. The belly is white. The animals are often found in open pits, holes or washouts where they have fallen. One specimen I have just fills a quart jar.

4. *Bufo cognatus cognatus* (Say)

This is the most common toad of the southwest. These toads call and breed in and along the irrigation ditches, whenever water is present. They

were seen in great numbers during July. They leave the ditches and wander through the fields and gardens between rains and irrigation intervals and show little fear of man. As is usual among toads, the males are smaller but more numerous than the females. The digging spur is well developed.

5. *Hyla arenicolor* Cope

Tree toads of this species were found in White House Canyon, in the Santa Rita Mountains, August 3. Males were heard calling just before dark from branches of oak trees, about fifteen feet from the ground. The call was an even, strong trill. Tadpoles of *H. arenicolor* were found in pools nearby with some of the larvae transforming at 18 mm. body length.

6. *Rana pipiens* Schreber

Leopard frogs were common along the stream in Sabino Canyon. One large individual was also found under a bunch of hay on University Farm, at least two hundred yards from any permanent water. The young were transforming the latter part of July. All individuals examined showed very bright orange coloration on backs of thighs and on flanks. The dorsal spotting is irregular; the tympanum may or may not have a light spot; the spot on the snout is also variable; the legs are barred. The general coloration is grayish with many showing green or brown as a dominant color.

Reptiles

1. *Cnemidophorus sexlineatus perplexus* (Baird and Girard)

Common in Santa Catalina foothills. Two forms of this species are found. One shows spotting between the longitudinal stripes and on the thighs. The distance between the median stripes equals the distance between the first and second stripes on the side. The other form has the spotting indistinct or absent, and the median dorsal stripes very close together. These variations are not correlated with size.

2. *Uta stansburiana elegans* (Yarrow)

Taken on University Farm.

3. *Uta ornata linearis* Baird

Common on University Farm.

4. *Holbrookia maculata approximans* (Baird)

The specimen of *Bufo alvarius* referred to above regurgitated my only specimen of this lizard.

5. *Holbrookia texana* (Troschel)

Common in the Santa Catalina foothills in association with *Callisaurus ventralis.*

6. *Callisaurus ventralis ventralis* (Hallowell)

A conspicuous lizard of the Santa Catalina foothills.

7. *Sceloporus clarkii* Baird and Girard

One specimen was taken from a stone wall in White House Canyon, Santa Rita Mountains, August 2.

8. *Sceloporus jarrovi* Cope

Common in the rocky areas of White House Canyon between 6,000 and 8,000 feet elevation. Young individuals are darker than the adults. Many are infested with red mites.

9. *Phrynosoma solare* Gray

Common in the latter part of July along Prince Road, north of Tucson.

10. *Phrynosoma douglasii hernandesi* (Girard)

One individual was taken at an elevation of 9,000 feet on Mount Baldy in the Santa Ritas, August 3. Its colors harmonized perfectly with the reddish brown and gray of the soil and rocks.

11. *Heloderma suspectum* Cope

The Gila monster is still quite common in the rocky foothills of the ranges surrounding Tucson. Occasionally one is seen awkwardly crossing a road or is found in a garden. I found them in the foothills of the Santa Ritas and Catalinas.

12. *Chilomeniscus cinctus* Cope

One specimen was found under a stump near Prince Road, August 15. This snake could move through loose dirt as fast as it could over the surface.

13. *Tantilla nigriceps* Kennicott

One of these small snakes was taken from a swimming pool in White House Canyon, August 3.

14. *Masticophis flagellum frenatus* (Stejneger)

A large individual was observed in White House Canyon, August 3.

15. *Coluber constrictor mormon* (Baird and Girard)

Found along irrigation ditches, University Farm.

16. *Pituophis catenifer rutilus* Van Denburgh

An individual four feet in length was found on North Campbell Avenue.

17. *Terrapene ornata* (Agassiz)

This box turtle was common in the gardens on University Farm. An examination of stomach contents showed its food to be largely insects, chiefly June beetles.

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Herpetological Notes

THE STATUS OF TWO PERUVIAN LIZARDS.—The discovery that one of the specimens determined by Boettger (1889, p. 311) as *Amphisbaena occidentalis* Cope was conspecific with examples collected close to the type-locality of *A. townsendi* Stejneger, raised doubts as to the correctness of Boettger's determination or the validity of the last-mentioned species. In the description of *A. townsendi* a number of differences from *occidentalis* are mentioned, but only one of these appears to be significant,—the possession by the former of about 100 more annuli on the body. For many years this alleged disparity could not be checked owing to the disappearance of Cope's types, but now, thanks to the researches of Professor Dunn they have been re-discovered in the museum of the Philadelphia Academy, and the counts, which he has courteously made at the writer's request, reveal that Dr. Stejneger was the victim of a miscount. *A. townsendi* is probably conspecific with *A. occidentalis*, but the very limited series of specimens available makes it seem possible that a northern race with a slightly higher number of caudal annuli may prove to be recognizable.

Specimens	*Locality*	*Annuli on Body*	*Annuli on Tail*
Co-types of *A. occidentalis*	Valley of Jequetepegue	276	19
Cope		273	23
Phil. Ac. 11355-11358		266	21
		269	21
Boettger's specimens	Pacasmayo. "Only a few	273	18
(Boettger 1889) B.M.N.H. 89.	Kilometers from Cope's	265	22
7.19.1.	original locality."	278	23
		274	25
A. townsendi Type. U.S.N.M. 47087.	Piura	276	25
		277 (approx.)	25
B.M.N.H. 1929. 12.12.2-5	Lobitos, Talara	271	26
coll. Dr. Burgess Barnett.		277	27
		277 (approx.)	28

The specimens called *A. darwini* by Peracca (1895, p. 9), but thought by Stejneger to be referable to *A. occidentalis*, have already been referred to a distinct species (Parker 1928, p. 383).

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H. W. PARKER, *British Museum (Natural History), London, England.*

COMMENTS ON POLYPEDATIDAE.—I have recently had the opportunity of examining a considerable number of specimens of those genera of frogs which Noble has recently grouped into a new family, Polypedatidae. These investigations have been carried on in the extensive collection at the Museum of Comparative Zoology.

The only consistent character differentiating this group of genera from those of the Ranidae is the presence of an intercalary cartilage in the digits and an examination of several species in each of eleven of the thirteen genera included in this group reveals the presence of intercalary cartilages in every case. Although not all of the species available were examined, and although two genera were omitted, the results are nevertheless significant.

The following list of species were examined:
Aglyptocephalus madagascariensis (A. Duméril);

Chiromantis petersii Boulenger, *rufescens* (Günther), *xerampelina* Peters;
Hylambates hyloides Boulenger, *maculatus* A. Duméril, *natalensis* (Smith);
Hyperolius concolor (Hallowell), *horstocki horstocki* (Schlegel), *kivuensis* Ahl, *marginatus* Peters, *mariae* Barbour and Loveridge, *marmoratus* Rapp, *montana* Angel, *ocellatus* Günther, *platyrhinus picturatus* Peters, *platyrhinus* Procter, *puncticulatus* (Pfeffer), *rhodoscelis* (Boulenger), *rossii* Calabresi;
Kassina senegalensis (Duméril and Bibron);
Leptopelis aubryi (A. Duméril), *bocagii* (Günther), *brevirostris* Werner, *johnstoni* (Boulenger), *notatus* (Bucholz and Peters), *ocellatus* Mocquard, *palmatus* (Peters), *rufus* Reichenow, *uluguruensis* Barbour and Loveridge;
Mantella baroni Boulenger, *ebenaui* (Boettger);
Mantidactylus guttulatus Boulenger, *ulcerosus* (Boettger);
Megalixalus brachynemis Boulenger, *dorsalis* (Peters), *forasinii* (Bianconi), *madagascariensis* (Günther);
Philautus aurifasciatus (Schlegel), *glandulosus* (Jerdon), *leucorhinus* (Martens), *vittatus* Boulenger;
Polypedates aculeatus Gray, *appendiculatus* Günther, *bimaculatus* Boulenger, *eques* Günther, *goudoti* (Tschudi), *leucomystax* (Gravenhorst), *macrotis* Boulenger, *maculatus* (Gray), *mocquardi* Boulenger, *ostoni* Stejneger, *pardalis* (Günther), *reinwardti* (Wagler), *schlegeli* Günther, *tephraeomystax* A. Duméril.

It is worthy of notice that some of these, such as *Mantidactylus guttulatus*, are large frogs, others, like *Megalixalus brachynemis*, are small. Examination of a number of Raninae, Petropedatinae, and Cornuferinae failed to disclose any intercalary cartilages.

The presence of an intercalary cartilage is a consistent taxonomic character for this group. It is not, however, in my opinion really worthy of elevation to the status of a family but rather it seems to me to be characteristic of a very good subfamily of the Ranidae. The presence or absence of intercalary cartilages is a character more comparable with such characters as the presence or absence of vomerine teeth, of calcification characters of sternum and omosternum, the shape of the pupil, the presence or absence of digital dermal scutes, and the shape of the terminal phalanges rather than with more fundamental characteristics of skeletal variations on which family differences had best be considered to be dependent.

Noble claims that this probably natural group has evolved from the Ranidae in much the same way that the Hylidae have evolved from the Bufonidae. It is true that a case of parallel evolution appears to exist between these two widely separate groups but would not there be numberless families in the classification of amphibia if they were based on instances of parallel evolution?—BENJAMIN B. LEAVITT, *Museum of Comparative Zoology, Cambridge, Massachusetts.*

AN ABERRANT *NATRIX CLARKII* (BAIRD AND GIRARD).—A female specimen of *Natrix clarkii* (M.J.A., No. 1304), taken on the back bay of Biloxi, March 18, 1932, from a typical salt marsh habitat, exhibits certain peculiarities in color pattern that, while of probably no particular significance, are considered of sufficient interest to warrant recording, especially in view of the fact that with the exception of this individual all other specimens coming under my observation have been constant in their agreement with the characters of the species.

In other respects the specimen appears to be normal in having 21 scale rows, 10 infralabials, 8 supralabials and 134 gastrosteges. It is 367 mm. in length. The coloration is much faded but the pattern consists of a faint median dorsal line extending from the parietals to 5 scale rows posterior to the anus and covering the middle row of scales and half of each adjoining scale row. The lateral stripes are more distinct and anteriorly are 1 to 1½ scale rows in width but 115 mm. from the snout become broken and alternately expand and contract until at a point 75 mm. in front of the vent they become joined to the light band, encompassing the tips of the gastrosteges and first row of scales by a series of hour glass-shaped markings of a brownish hue. These are 1 to 2 scales wide at the constriction and broaden to 2 to 4 scales in width at their junction with the longitudinal lines. The lowermost stripe is similar to the second in its irregularity.—MORROW J. ALLEN, *Biloxi, Mississippi.*

Ichthyological Notes

FISH NOTES FOR 1931 AND 1932 FROM SANDY HOOK BAY.—The work of the New York Aquarium collecting boat, *Seahorse*, brought to light no new records or items of special interest in 1931. Consequently, all the data here listed refer to the year 1932.

1. *Hyporhamphus roberti.* (Cuvier and Valenciennes).—A new record for Sandy Hook Bay. Two specimens, both males, 144 and 150 mm. in standard length. These were taken August 11, in company with a school of *Strongylura marina* (Walbaum) of about the same size, and were seined together with *Synodus foetens* (Linnaeus), *Mullus auratus* Jordan and Gilbert and *Synynathus fuscus* Storer.

2. *Vomer setapinnis* (Mitchill).—Small specimens of this species are generally common in Sandy Hook Bay. These range up to about 50 mm. in standard length. In 1932, during August and September, however, much larger ones were also common. A sample of the larger fishes (17 specimens) ranged from 141 to 167 mm. in standard length and averaged 152 mm.

3. *Trichiurus lepturus* Linnaeus.—A single specimen of 876 mm. total length was taken in a pound net on June 30. It is a new record for this Bay, as well as both an early and a size record for the New York region.

4. *Chaetodon ocellatus* (Bloch).—A single specimen, 34 mm. in standard length; October 26. A late date.

5. *Mola mola* (Linnaeus)..—A single specimen with the following measurements was taken on September 15. Total length, 126 cm.; total height, 160 cm., weight, 227 pounds. It was an unripe male. The stomach contents consisted of three jellyfish, *Aurelia* sp., various seaweeds including *Ulva,* and some brown algae, as well as fragments of sponge. This specimen was turned over to the American Museum of Natural History. A late date for Sandy Hook Bay.

The unusual run of small mackerel about New York in 1932, did not seem to get into Sandy Hook Bay in any quantity although they were taken in numbers from State Island piers and elsewhere, as far east as Montauk Point. They were most abundant about New York City in the first week of August. Prior to that date, July 12, still smaller ones were abundant at the Montauk Yacht Club harbor[1]. On that date a sample of 12 *Scomber scombrus* Linnaeus ranged from 127 to 143 mm., and averaged 138 mm. These were apparently some of the same group that later appeared in New York Harbor.

This list adds two species to the fish fauna recorded from Sandy Hook Bay, *Hyporhamphus roberti* and *Trichiurus lepturus,* bringing the total to 122. The series of records reported mostly in COPEIA for the last twelve years, if divided into quarters, shows the following numerical relationship with regard to the total number of species recorded at the end of each period: 95, 112, 118 and 122. From this it would seem that slight additions can be subsequently expected.—C. M. BREDER, JR., *New York Aquarium, Battery Park, New York City.*

THE STATUS OF *OSPHRONEMUS SAIGONENSIS* BORODIN.— In the Bulletin of the Vanderbilt Marine Museum, vol. I, art. 2, 1930, p. 48, Borodin has described this species, based on a single specimen collected at Saigon, French Indo-China. It is evident from the description that the fish is not an *Osphronemus* but a *Trichogaster.* As I am very familiar with the four recognized species of this genus, all of them abounding in Siam, I am interested in the reported existence of another species in Indo-China, where at least three of the known forms occur. Borodin notes that the species nearest to *Osphronemus saigonensis* is *O. siamensis* Günther, which is a synonym of *Trichogaster trichopterus* (Pallas). This is a very common fish in Siam and in Cambodia and Cochin China (of which last Saigon is the capital), and is subject to considerable variation in shape, squamation, fin formulae, and color. This variation would apparently fully cover *saigonensis.*—HUGH M. SMITH, *Department of Fisheries, Bangkok, Siam.*

[1]These notes were made on a cruise of the *Querida,* while guest of Mr. Daniel Bacon.

A NEW RECORD OF *OSTRACION DIAPHANUM* BLOCH AND SCHNEIDER FROM CALIFORNIA.—Three specimens of the cowfish or trunkfish, *Ostracion diaphanum* Bloch and Schneider, have recently been taken along the coast of Southern California and brought to the Los Angeles Museum. This appears to be the first occurrence of the species on the Pacific Coast of the United States. Its usual range is from the East Indies to Japan. The present examples are typical in form and coloration with the exception that some variation is shown in the structure and arrangement of certain spines on the carapace.

The largest specimen was taken alive in a net off Santa Barbara, California, the latter part of November, 1932. It measured 7 inches in length, the carapace being 4¾ inches long. The left supraocular spine is bent more sharply outward than is the right. The lateral spine on the right dorsal ridge is larger and more advanced forward than the corresponding spine on the left dorsal ridge. The median dorsal spine is scarcely recurved.

Another individual was caught in a net near the kelp beds off San Pedro, California, on December 1, 1932. Its total length is 5 inches and the carapace 3½ inches.

The other specimen was washed up on the beach at Santa Monica, California, on December 5, 1932. It measures 5¼ inches in length and the carapace 3¾ inches. The left supraocular spine is undeveloped while the corresponding spine on the right is short and much thickened. The central, lateral spine on the right ventral ridge is weakly developed and is only represented by a small, sharp point. On the left ventral ridge, the position of the central spine is nearer to the posterior spine than to the anterior. The normal position of the central spine is half way between the two.

In all specimens, several rows of black blotches, roughly circular in outline, appear above and below the ventral ridge. Otherwise, the lower part of the body, below a line drawn from the gill opening to the tail, exhibits the characteristic translucent appearance of the species.—HOWARD R. HILL, *Los Angeles Museum, Exposition Park, Los Angeles, California.*

A RECORD OF THE LUVARU (*LUVARUS IMPERIALIS* RAFINESQUE) FROM SOUTHERN CALIFORNIA.—A large specimen of the rare *Luvarus imperialis* was captured at Redondo Beach, California, near Los Angeles, on the afternoon of November 20, 1932. It measured six feet, one inch, in length and weighed 305 pounds. Only once before has this species been recorded from local waters. The fish came ashore, in a live but apparently injured condition and was killed with an iron bar. It was taken to the Los Angeles Museum where a life size cast was made of the body and the skeleton prepared for exhibition.—HOWARD R. HILL, *Los Angeles Museum, Los Angeles, California.*

A CASE OF ARTERIAL CONSTRICTION OF THE SPLEEN IN THE DOGFISH.—Recently a large male of the dogfish shark (*Squalus acanthias*), which was under dissection in our comparative anatomy laboratory, was found to have the spleen divided into a small posterior lobe and a large anterior lobe by a transverse constriction formed by three loops of the posterior intestinal artery. While there is apparently no way of determining whether this abnormality was developed in embryonic life or not, it had probably been present for a considerable time, since the two splenic lobes were held together by a narrow cord-like constriction less than two millimeters wide. The greatest total length of the organ was 103 mm., the length of the anterior lobe being 68 mm., and that of the posterior lobe 35 mm. The greatest width of the anterior piece was 35 mm., as contrasted with 12 mm. for the posterior section. No differences in color were noted when the two lobes were compared. Numerous small blood vessels were visible on the surface of the connecting cord, in which they were concentrated due to the pressure of the arterial strangulation. The three loops in the posterior intestinal artery were easily unwound and the spleen freed of this feature during the present examination of the specimen, at which time it was apparent that due to the natural slack in this artery these coils had not been pulled taut enough to accomplish complete amputation of the tip of the spleen.—CHARLES E. BURT, *Southwestern College, Winfield, Kansas.*

BLUE PERCH.—On September 3, 1932, Mr. W. D. Bates of Ridgetown, Ontario, sent to the Royal Ontario Museum of Zoology a specimen of what he called albino perch. The specimen was packed in ice, and was received in excellent condition. On receipt it appeared bluish, suggesting the color of the blue pickerel, *Stizostedion glaucum* Hubbs. In a subsequent statement Mr. Bates said that the perch had the bluish shade when caught, that it was marked by the black, vertical markings as in the case of the typical form, but that there was no yellow coloration in it. He also said that perch of this coloration are very rare, and that he had probably seen only half a dozen in his fifty years' fishing in lake Erie.

One cannot help thinking that the cause of this bluish coloration in a typically yellow colored species is similar to that which gives rise to the blue pickerel. This difference is probably in the nature of a physiological variation, and I believe that specific differentiation often has its inception in such variations. Whether natural selection will ultimately produce a blue perch is something which only time can tell.

Dr. Carl L. Hubbs informs me that he has had a trustworthy report of similar blue perch occurring rarely in Saginaw Bay, Michigan.—J. R. Dymond, *Royal Ontario Museum of Zoology, Toronto, Canada.*

Reviews and Comments

Progress on the Bashford Dean Memorial Volume on Archaic Fishes.—Soon after the death of Professor Bashford Dean on December 6, 1928, some of his former colleagues and friends at the American Museum of Natural History and Columbia University met and formed the Bashford Dean Memorial Committee. The object of the committee was to bring about the publication of a memorial volume containing among other appropriate matters a series of color plates reproduced by photolithography. The original drawings for such plates had been executed chiefly by Dean himself for his own projected memoirs on the embryology of the California hagfish (*Bdellostoma stouti*), the Frilled Shark (*Chlamydoselachus anguineus*) and the Port Jackson Shark (*Cestracion* (=*Heterodontus*) *philippi*). This exceedingly rare and important series of eggs and embryos had been collected by Dean in several parts of the world during his long activities as a zoologist. A few of them he had already published, but he had been prevented from completing and publishing the greater part of his material by the circumstance that he was equally eminent and probably much more widely known as a collector and connoisseur in European armor of the middle ages and that he finally became the founder and curator of the Department of Arms and Armor at the Metropolitan Museum of Art in New York, where he amassed an enormous collection in this field.

Thanks to gifts and subscriptions from Dr. Dean's family, friends and colleagues, the committee was successful in securing funds for the reproduction of the plates while the trustees of the American Museum of Natural History undertook to publish the Dean Memorial Volume on Archaic Fishes as fast as the separate parts could be completed by several specialists.

Under the able editorship of Dr. Eugene Willis Gudger four parts of the volume have already appeared while several others are in press or otherwise in progress.

In Article I, A Biographical Sketch of Bashford Dean by the present writer, are set forth some of the home influences and educational experiences that led to Dean's delightful personality and unique achievements.

Article II, "The Segmentation of the Egg of the Myxinoid, *Bdellostoma stouti*, Based on the Drawings of the Late Bashford Dean," by E. W. Gudger and Bertram

G. Smith, describes the earlier stages of cleavage of the egg of *Bdellostoma stouti*, the latter stages having been described in Dean's own memoir of 1899.

In Article III, "The Genital System of the Myxinoidea: A Study based on Notes and Drawings of these Organs in *Bdellostoma* made by Bashford Dean," Dr. J. LeRoy Conel confirms Dean's finding that *Bdellostoma stouti* is certainly not hermaphroditic in any respect, even although many individuals of *Myxine* have either a functional testis and a non-functional ovary or the reverse, as shown by A. and K. E. Schreiner in 1905 and 1908, in continuation of Dean's earlier inquiries on this subject.

Article IV by Anatol Heintz is entitled "The Structure of *Dinichthys* A Contribution to our Knowledge of the Arthrodira."

Dinichthys was an extinct type of giant fish-like vertebrates the fossil remains of which are found in the Cleveland Shale, of Upper Devonian Age. The big skull and jaw plates early engaged the attention of collectors, the first reconstruction of the skull and dorsal carapace having been published in 1875 by the geologist Newberry, Dean's professor at Columbia University. The scientific game of fitting these scattered pieces together was played by Newberry, Claypole, Dean and many of their successors, but it has remained for the young curator of the Paleontological Museum at Oslo, Norway, after a year of intensive investigation of the collections left by Newberry and Dean, to evolve a new and definitive restoration of the skeleton of *Dinichthys*. By acquiring an irrefutable knowledge of the contacts of every bone on this three dimensional picture puzzle Dr. Heintz has not only succeeded in detecting radical errors in all earlier restorations but has also paved the way for his far-reaching conclusions concerning the relationships of the extinct group of Arthrodira to which *Dinichthys* belongs.

More in detail some of the outstanding features of this contribution are as follows: (1) The pair of joints between the back of the head and neck, the shield to which the group name Arthrodira refers, acted like a pair of hinges on a gate except that they were in a horizontal plane. Owing to the vertical crushing of the convex plates that carried the cylinder and the socket respectively, the opposite hinge joints are usually pitched downward in the actual fossils, but Heintz shows that they could only have functioned if they were horizontal in life and that when the convexity of the intervening portion of the plates is properly restored the joints permit the raising of the head on the neck plates. All previously published restorations had been at fault in this respect. When this critically important correction is made the whole shape of the head becomes rounder and more fish-like.

(2) Heintz confirms and extends the general interpretation of the mechanism and movements of the head and mandible which had been independently proposed by Jaekel and by L. A. Adams in 1919. He concludes with Adams that there were four sets of muscles involved in this movement. This arrangement is entirely unique among fish-like vertebrates outside of the Arthrodira and its presence supports Dr. Heintz's conclusion that the Arthrodira were widely removed from both the Elasmobranchs and the higher fishes. At the same time he confirms the general conclusion of Dean and of Hussakof that the Arthrodira were related to the Antiarchi and together constituted an independent extinct class of vertebrates, the Placodermata of McCoy. We may welcome both the definitive publication on *Dinichthys* and the establishment of a landmark in the early evolution of the vertebrates.—WILLIAM K. GREGORY, *American Museum of Natural History, New York City.*

EDITORIAL NOTES AND NEWS

Piscium Catalogus

THE German scientific publisher W. JUNK (Berlin W. 15, Sächsische Str. 68, has just announced the proposed publication, beginning with January 1933, of PISCIUM CATALOGUS, a synonymic and distributional check-list of the fishes of the world, to be accompanied by a complete bibliography and index. The literature on the economically important species would be included. The competence of the firm to handle this large project is attested by the fact that it is now publishing three similar catalogs, excellently covering Coleoptera, Lepidoptera and fossils. More than 240 parts of these three catalogs have appeared.

About 16 volumes of 400 pages each are anticipated, to cover the estimated 500 families and subfamilies, 5000 genera and 40000 species of fishes.

The crying need for a work of this sort is evident to every ichthyologist. The last world treatise on fishes was Günther's *Catalogue of the Fishes of the British Museum*, published 62 to 73 years ago. Most of the advance in systematic ichthyology has been made in the last half-century. Günther treated approximately only one-fifth the number of genera and species now recognized. Not only is Günther's *Catalog* almost hopelessly out-of-date, but it is almost impossible to obtain. The eight volumes now sell for more than $200.00.

The publication of this monumental work is dependent on the number of advance subscriptions received. The price as announced is Mk. 1.60 per signature, and the annual cost is estimated as about 48 Mk.—. The work should prove virtually indispensible in all major ichthyological research, should be in the hands of every working ichthyologist and should be on the shelves of every zoological museum and of every library devoted wholly or in part to natural science.

If the Piscium Catalogus can be undertaken, Junk proposes to publish also an AMPHIBIORUM ET REPTILIUM CATALOGUS.

New York Zoological Society

THE New York Zoological Society has remodelled a one-story brick building in its Zoological Park, to serve as the laboratory for the Department of Tropical Research, and as a museum to hold the varied collections made by DR. WILLIAM BEEBE and his associates.

At the New York Aquarium, on November 2, DR. CHARLES HASKINS TOWNSEND was honored at a reception by the staff and employees of the Aquarium. The occasion was the completion of thirty years in the directorship of the institution.

Herpetological Items

DR. E. R. DUNN with the able assistance of Mrs. Dunn and of his student, Jean Piatt, is engaged in a revision of the herpetological collections of the Philadelphia Academy of Natural Sciences.

The Swiss herpetologist, DR. RUDOLF STOHLER, and Mrs. Stohler are living this year in the United States. He has been spending some time in the museums of the country continuing his observations on the sex organs of the Bufonidae, and is now in Oakland, California (3537 Galindo St.).

Word just received from KARL P. SCHMIDT at Vienna states that he is completing his round of European museums, and will sail for America on January 6.

The herpetological material collected by Major Chapman Grant during the past few years on Porto Rico and adjacent islands, comprising over seven thousand specimens including his types, and beautifully representing the herpetological fauna of these islands, has been acquired by the Museum of Zoology of the University of Michigan and the Museum of Comparative Zoology of Harvard University. Major Grant is now stationed at Indianapolis, Indiana (412 East Fall Creek Boulevard).

1933 Meeting

THE American Society of Ichthyologists and Herpetologists will hold its annual meeting for 1933 at the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, in May. As for the several years past, the meeting will be held in conjunction with the annual gathering of the American Society of Mammologists. A further announcement will either be included in the next number of COPEIA or sent through the mail.

An interesting meeting is in prospect. The Secretary will be glad to receive word from those who expect to attend, and titles of the papers they may contribute.

National Museum

DR. GEORGE S. MYERS, of Stanford University, has just been appointed Associate Curator of Fishes in the U. S. National Museum. The Editors of COPEIA wish to compliment the Smithsonian authorities for filling this important position at the present time, and to congratulate Dr. Myers on the appointment, for which he is admirably fitted.

The National Aquarium Society

THE newly organized National Aquarium Society held its first regular meeting in the Aquarium of the Commerce Building on November 18, 1932, with an attendance of about 100 persons including members and visitors. The officers of the society were greatly pleased over the enthusiasm and interest taken. Twenty persons submitted their names to become members. The object of the society shall be the popular and scientific study of the aquarium, its flora and fauna.

The officers of the society consist of J. J. FITZPATRICK, president; WILLIAM BROWN, vice president; and a board of councilors consisting of DR. LEWIS RADCLIFFE, DR. PAUL BARTSCH, DR. WILLIAM MANN, and FRED G. ORSINGER.

It is the intention of the society to hold regular monthly meetings throughout the year with the exception of July and August.—From *Fisheries Service Bulletin.*

The Plural of Fish

MANY questions are asked as to the proper plural of the word "fish." Answers differ. The editorial policy of COPEIA is to use "fish" as a collective plural when more than one *individual* is referred to, but to use "fishes" when more than one *species* is indicated. This is in line with common practice in forming the plural of other animal names, as, for example, "deer."

Recent Death

DR. WILLIAM PATTEN, Professor Emeritus of zoology at Dartmouth College, widely known for his theory that the vertebrates evolved from specialized arachnids, and for his researches on fossil arachnids and fossil fishes, died on October 27, at the age of seventy-one.

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